Tropical Medicine, the Liverpool School of Tropical Medicine, and the various colonial laboratories; and, lastly, the circular letter sent by the Colonial Secretary to the Colonial Governors with regard to the renewal of contributions to the Tropical Diseases Research Fund. Many of these reports contain matter of much interest. From British Guiana come reports by the Government bacteriologist, Dr. K. S. Wise, and Prof. Deycke on the results of Prof. Deycke's treatment of leprosy during the first six months' trial. In the report of Dr. Castellani from Ceylon, peculiar parasites are described from the blood of man and other vertebrates in Ceylon, with illustrations of a relatively high standard. These parasites are found free in the blood-plasma and resemble the free "vermicules" of hæmogregarines, but do not appear to have any intracorpuscular stage. Dr. Castellani considers them to be Protozoa of a genus distinct from hæmogregarines, and compares them with bodies found in human blood in Algeria by the brothers Sergent, whose name is translated into Sergeant, in our opinion somewhat unnecessarily.

From East Africa the Government bacteriologist, Dr. P. H. Ross, gives an account of a number of experiments on the transmission of trypanosomes by *Glossina fusca* and *G. longipennis*. Amongst these special interest attaches to one in which a monkey was successfully infected with *Trypanosoma gambiense* by means of *Glossina fusca,* by the method of interrupted feeding. Two flies were used in this way on October 5, being first fed on an infected monkey and then transferred immediately to a healthy monkey; the experiment was repeated with three more flies on October 8; trypanosomes were first found in the blood of the second monkey on October 31. These experiments tend to show that tsetse-flies of species other than *G. palpalis* can transmit sleeping sickness by the direct or purely mechanical method.

The report shows the value and importance of the researches on tropical diseases that are being carried on in all parts of the world under the auspices of the Colonial Office and the Colonial Governments. Not only is the report encouraging for the future, but it is most interesting and instructive reading, and well worth the modest sum for which it is sold.

NOTES.

SIR ARCHIBALD GEIKIE, K.C.B., P.R.S., has been elected a foreign member of the Royal Danish Society of Sciences, Copenhagen.

THE death is announced, at eighty-four years of age, of Prof. Julius Kuehn, for many years professor of agriculture in Halle University.

THE annual meeting of the Iron and Steel Institute will be held on Wednesday and Thursday, May 4 and 5. On May 4 the retiring president (Sir Hugh Bell, Bart.) will induct into the chair the president-elect (the Duke of Devonshire). The Bessemer gold medal for 1910 will be presented to Mr. E. H. Saniter, and the president will deliver his inaugural address. A number of important papers will be read and discussed during both days of the meeting.

THE Geneva correspondent of the *Daily Chronicle* states that a monument in memory of Prof. Tyndall will be erected on the summit of the Bel Alp, 6735 feet high, a little above the place where for many years Tyndall resided during the summer months. Mrs. Tyndall has engaged M. F. Correvon, of Geneva, to design the monument, which is a large conical block of granite. It will be erected by the Swiss Alpine Club in July on Bel Alp, overlooking the Aletsch Glacier.

THE executive committee of the National Physical Laboratory has appointed Mr. J. E. Sears to take charge of the work of the metrology division of the laboratory in the place of Mr. H. Homan Jeffcott, who has been nominated recently to the professorship of engineering in the Royal College of Science, Dublin. Mr. Sears, who was formerly at St. John's College, Cambridge, graduated with first-class honours in mathematics and engineering, and is an associate member of the Institution of Civil Engineers.

UNDER the title of the *Journal of Genetics*, it is proposed to publish a periodical for original research in heredity, variation, and allied subjects. The journal will also, from time to time, contain articles summarising the existing state of knowledge in the various branches of genetics, but reviews and abstracts of work published elsewhere will, as a rule, not be included. Adequate illustrations will be provided, and, where the subject-matter demands it, free use will be made of coloured plates. The journal will be edited by Prof. W. Bateson, F.R.S., director of the John Innes Agricultural Institution, and Prof. R. C. Punnett, professor of biology in the University of Cambridge, and it will be published by the Cambridge University Press. It is hoped that the first number will be ready in August.

ON Tuesday next, April 26, Prof. F. W. Mott will begin a course of three lectures at the Royal Institution on "The Mechanism of the Human Voice"; on Thursday, April 28, Mr. W. McClintock will deliver the first of three lectures on "Blackfeet Indians in North America"; and on Saturday, April 30, Dr. D. H. Scott will commence a course of three lectures on "The World of Plants before the Appearance of Flowers." The Friday evening discourse on April 29 will be delivered by Dr. Tempest Anderson on "Matavanu: a New Volcano in Savaii (German Samoa)"; on May 6 by Sir Almroth Wright, on "Autoinoculation"; and on May 13 by Prof. W. H. Bragg, on "Radio-activity as a Kinetic Theory of a Fourth State of Matter."

AN interesting light has just been shed upon a controversy which excited some attention in 1907 (see NATURE of that year, September 26, p. 545, and October 17, p. 615) by the publication of the official report on "The Tomb of Queen Tîyi" (Constable and Co., Ltd., 1910). Two years ago archæologists maintained that the bones found in the tomb were the remains of the mummy of the queen herself, and seemed to regard as a matter of little importance the anatomical fact that the skeleton was that of a young man. Sir Gaston Maspero now states (*op. cit.*, p. i) that "when we came to examine the mosaic coffin and the sheets of gold in which the mummy was wrapped, we found that their legends asserted the mummy to be no other than Khuniatonu himself" (Queen Tîyi's son).

THE Seismological Society of America at a recent meeting passed a series of resolutions expressing its views on the establishment of a National Bureau of Seismology, and decided that copies of the resolutions should be transmitted to the President, President of the Senate, the Speaker of the House of Representatives, and the secretary of the Smithsonian Institution. After enumerating the chief earthquake disasters in the United States, and summarising what has been done in other countries for the encouragement of the study of seismology, the resolutions state that the Seismological Society of America strongly favours the establishment of a National Bureau of Seismology with power (*a*) to collect seismological data; (*b*) to establish observing stations; (*c*) to study and investigate special earthquake regions within the national domain; (*d*) to cooperate with other scientific bodies and organisations and individual men of science in forwarding the development and dissemination of seismological knowledge. The society also favours the organisation of this bureau under the Smithsonian Institution, with the active cooperation of other scientific departments of the Government.

In the death of Sir Walter Palmer, Bart., on April 16, at fifty-two years of age, the cause of higher education has suffered a heavy loss. Nowhere will that loss be felt more grievously than at Reading, for to Sir Walter Palmer more than perhaps to any other individual the University College of that town owes its origin and rapid development. Largely to his initiative was due the merging, some twenty years ago, of the University Extension Centre and the School of Science and Art into one institution, which has become the flourishing University College of to-day. The number of the benefactors of higher education in this country is not large. The institutions which they aid make heavy claims upon them, claims, not only on their wealth, but also on their time. That these claims are met unfailingly by men like Sir Walter must rejoice the hearts of those who believe that, "after bread, education is the first need of a people." From 1897 to 1903 Sir Walter was chairman of council, and in that capacity received the Prince of Wales on the occasion of the opening of the new college buildings in 1898. After his resignation of the chairmanship he remained a member of council and of the academic board. His deep and abiding interest in education was not confined to Reading; and the work done by him in London—he was a member of the Senate of the University of London—is widely known and appreciated.

The Liverpool Marine Biological Station at Port Erin has been very fully occupied with workers during the present spring vacation. In the month from the middle of March more than forty senior students and professional biologists, representing six or seven universities, have occupied work-places. Amongst these may be mentioned Mr. Walter Tattersall (development of Littorina), Dr. Henderson (development of plaice), and two senior students, all from the University of Manchester; Dr. Stuart Thomson (Alcyonaria), from Bristol University; Mr. W. J. Dakin (memoir on Buccinum), from Belfast University; Mr. W. Riddell (plankton), Dr. J. Pearson (memoir on skate), Mr. Douglas Laurie, Prof. Herdman (plankton), and about twenty-five senior students from the biological departments of Liverpool University; Prof. Cole and three senior students from Reading; two from Cambridge, one from Birmingham, and a few others. Every work-place is now occupied, and an extension of the laboratory accommodation is urgently required. Work at sea, from the S.Y. *Ladybird*, is being carried on actively. The plankton on the surface of the Irish Sea is at present very abundant, and all the nets are giving large hauls. The vernal increase in phyto-plankton (such as diatoms) made its appearance this year between March 22 and 26, an unusually early date. Last year the phyto-plankton was not present in quantity (more than a million per fifteen minutes' haul of standard net) until April 19; in 1908 it began about the middle of April (from April 13 onwards), and in 1907 the maximum covered the last week of March and first fortnight of April—apparently the present season is more like 1907 in this respect than the two intermediate years. In the fish-hatchery the present season has been a late one, but in other respects is satisfactory. The spawning of the parent plaice (about 400 adult fish) in the pond began on February 14, but the numbers of fertilised eggs produced remained low until March 7, since when they have been spawned in abundance, the maximum on one day being 634,000, on April 12. The total number of eggs skimmed from the pond, to April 16 inclusive, is above 8⅓ millions, and the number of larval plaice set free in the open sea, to April 15, is 3,365,000. The spawning is still in progress, and will probably continue for several weeks.

Dr. Knut Stjerna, a promising anthropologist of Upsala, whose death, we regret to learn, occurred at an early age in November last, contributed to the January-February number of *L'Anthropologie* an elaborate paper entitled "Les Groups de Civilisation en Scandinavie a l'Epoque des Sépultures à Galerie." He recognises the remains of three races in this region:—first, the east and north were occupied by a race of fishermen and hunters, who retained much of the Palæolithic culture, and were connected across the Aland Archipelago with the people of east and south-east Europe; secondly, the Danish islands and the adjoining mainland were colonised by a people skilled in bee-culture, who possessed a regular type of weapons, and traded in the North Sea; lastly, there was on the west a foreign race, emigrants from Central Europe, possessing a civilisation which at the close of the period of the gallery tombs had begun to assert its influence on the adjoining Scandinavian races.

The question of the origin and distribution of the cross-bow in India presents an interesting problem. Mr. G. Forrest, in the *National Geographic Magazine* for February, under the title of "The Land of the Cross-bow," describes its use by a people whom he calls the "Lissoos" in the Upper Salwin valley in Burma. The bow is made of wild mulberry, with a span of 5 feet and a pull of 35 lb.; the stock is of wild plum wood, the string of plaited hemp, and the trigger of bone; the arrows are made of split bamboo, 16 or 18 inches long, and poisoned with aconite. Sir J. G. Scott describes a similar weapon in use among the Lashis or Yawyins and the Kachins. It is not mentioned by Messrs. Skeat and Blagden as in use among the Pagan races of the Malay Peninsula. Mr. Thurston, in his recent work on the "Castes and Tribes of South India," says that he found a weapon of this type in use among the Ulládans, a wild tribe of Travancore, for shooting fish, and a specimen of the weapon, now in the Pitt Rivers Museum, Oxford, was picked up among the Korwas, a wild tribe in Central India, south of the river Son. The Ulládans seem to speak of it as the Firingi (Frank or European) weapon, but it is difficult to suggest any route by which it could have reached the Burmese tribes. Being an obvious development of the common bow, it may have been independently invented by them.

At the end of an account of the birds obtained during the Alexander expedition to Alaska in 1908, Dr. J. Grinnell, in vol. v., No. 12, of the University of California Zoological Publications, directs attention to the tendency to melanism among the avifauna of the district. In this respect Alaskan birds resemble those from other regions with a heavy rainfall and damp climate. The melanism, there and elsewhere, cannot be directly attributed to the heavy precipitation, nor, in the author's opinion, to the humidity and paucity of light, but the true cause of the phenomenon is not at present apparent.

We have to acknowledge the receipt of the volume of the *Sitzungsberichte der k. Bohm. Ges. der Wissenschaften* for 1909, and among the contents we may refer to an account by Dr. Anton Fritsch of the discovery in the granitic area of Skuč of a superjacent deposit of altered sandstone containing Rudistæ and a number of other Upper Cretaceous molluscs. Another remarkable geological discovery recorded, by Mr. A. Hofmann, in the same volume relates to the occurrence of rounded pebbles of quartzite and other rocks in the brown coal formation. The author figures specimens of these pebbles *in situ*, but reserves an explanation of their mode of occurrence.

ZOOLOGICAL serials, both English and American, are flooded with descriptions of new forms of mammals from British East Africa, the American descriptions being based on specimens obtained during the Roosevelt expedition, which appears to have induced English naturalists to overhaul the collections in this country. The chief American contributors are Messrs. Heller, Miller, and Osgood; and among a batch of papers recently received we may refer to one by Mr. Heller on a sable antelope from the Shimba Hills, which is described as a new species, although, as it differs from the typical *Hippotragus niger* mainly by the non-assumption of the full sable livery, it is better regarded as a race of that species. A similar remark is applicable in the case of several of the other new forms, which are mostly rodents, and to the Angolan hippopotamus described by Mr. Miller as *Hippopotamus constrictus*.

IN the *Zoologischer Anzeiger* of March 1 (vol. xxxv., pp. 500–8) Dr. Max Schlosser announces the discovery in the Fayum Oligocene of remains of Primates which are referred to three new genera, viz. Mœripithecus, Parapithecus, and Propliopithecus. The last, as represented by *P. haeckeli*, is a small ape intermediate in size between Chrysothrix and Cebus, with the normal simian lower dental formula, the canine and premolars being vertical, and the two branches of the lower jaw running nearly parallel and forming a firm symphysis. Phylogenetically, this genus is regarded by its describer as of high importance, since, in his opinion, it is the ancestor, not only of the Simiidæ, but also of the Hominidæ. *Parapithecus fraasi* is a small species of the size of a squirrel-monkey, with the lower dental formula *i*.1, *c*.1, *p*.3, *m*.3. It is regarded as connecting the Eocene Anaptomorphidæ with the Simiidæ, and perhaps also with the Cercopithecidæ. *Moeripithecus markgrafi* is too imperfectly known to admit of its systematic position being determined; it was about the size of a spider-monkey. Dr. Schlosser also describes a number of new types of hyracoids from the Fayum, among which Bunohyrax is based on some of the species included by Dr. Andrews in Geniohyus, both genera being regarded as bunodont hyracoids. In this connection it may be mentioned that Dr. Marcellin Boule (*Comptes rendus*, vol. cl., p. 812) has just described remains of a species of the Siwalik genus Merycopotamus from Upper Tertiary strata in southern Tunisia. This *M. africanus*, as it is named, affords further evidence in favour of Dr. Arldt's theory as to the migration of the Siwalik fauna through a forest-tract to Africa.

THE association of particular species of insects with particular flowers has always been a matter of interest to those who concern themselves with the question of the natural means of cross-fertilisation by insect agency. With respect to our native orchid, *O. maculata*, previous records have generally credited insects other than Lepidoptera as being the fertilising agents. In the *Entomologist* for November, 1909 (vol. xlii., p. 281), Prof. Meldola recorded the capture in August at Onich, Inverness-shire, of a specimen of the common "shark," *Cucullia umbratica*, with one of the pollinia of *O. maculata* attached to its head, thus proving that this moth visits the flower in question. Prof. Meldola's observation has been followed up by Mr. A. M. Stewart, of Paisley, who in the current number of the *Entomologist* (April, vol. xliii., p. 106) records *Plusia festucae* as a fertiliser of the same orchid. In view of the large numbers of moth collectors now at work in this country, it is remarkable that such few observations of this kind have been placed upon record. Photographic reproductions of the heads of both species showing the pollinium *in situ* are given in the *Entomologist* for this month.

WE have received the Year-book for 1909 of the Dairy Students' Union, a body founded four years ago to assist its members with advice on various difficulties that arise and information of vacancies occurring in different branches of dairying, and "to create and stimulate interest in scientific research and new inventions in the dairy world." The book contains several short articles by Messrs. Blackshaw, D. A. Gilchrist, T. R. Robinson, C. W. Walker-Tisdale, and other dairy writers, and there is an interesting set of replies to queries that have been sent in by members during the year and dealt with by the advisory board.

THE direct determination of the total solids in milk presents certain practical difficulties which would be of serious disadvantage to the ordinary analyst who has to make a large number of determinations. It is found, however, that a simple formula expresses with sufficient accuracy the relation between the total solids, the fat (as determined by Gerber's or similar methods), and the specific gravity determined by the lactometer. Mr. Collins has recently issued an account of a slide rule that he has invented, and is now on the market, by which the necessary calculation, including the temperature correction, may be made at one setting. Such a rule will be of great benefit to the busy milk analyst, who has hitherto had to work out the calculation in the ordinary way. The paper is published in the University of Durham Philosophical Society's Proceedings.

PRINCE GALITZIN has recently published an interesting study of the records of the great earthquake of January 22 (*Bull. de l'Acad. Imp. des Sci. de St. Pétersbourg*, 1910, pp. 211–6). He estimates the distance of the epicentre from Pulkowa at 2400 km., and its azimuth N.W. −49·4°. From these data he assigns the following position for the epicentre, lat. 68° N., long. 17° W., that is, a little to the north of Iceland. This agrees somewhat closely with the position calculated by Dr. Tams from the epicentral distances from Jugenheim, Strassburg, Vienna, and Hamburg, namely, lat. 70·3°±1·7° N., long. 14·3°±2·2° W. According to intelligence received from Iceland, a violent earthquake took place in the neighbourhood of that island about the time mentioned.

THROUGH the courtesy of Dr. Reusch, director of the Geological Survey of Norway, we have received an abstract of the history and proceedings of the Norsk Geologisk Forening, founded in 1905, and of its predecessor, the Geologisk Klub of Christiania. This history is reprinted from the journal of the society, the *Norsk Geologisk Tidsskrift* (Bind i., 1909), and forms a complete record of investigations and discussions since 1893. Like the old Geological Club in London, the Norwegian club consisted mainly of men engaged in active geological research, and this character is maintained by its successor, the forty members of which resemble an academy rather than a general geological society. In the first volume of the *Tidsskrift* some of the papers are in German, while others have summaries in English. Scandinavian geology, as is well recognised, has a special interest for workers on our pre-Devonian rocks and for all interested in recent modifications of our shore-lines.

THE first part has appeared of the comprehensive work entitled "Handbuch der Regionalen Geologie," edited by Profs. Steinmann and Wilckens, of Bonn (Heidelberg: Carl Winter, 1910). This includes the whole of Denmark, by Dr. N. V. Ussing, of Copenhagen, and is published at the moderate price of 1.60 marks, or 1.20 marks to subscribers. The scheme of the editors is already in full operation, and some sixty contributors of various nationalities are at work on the subdivisions of the eight royal octavo volumes. Landscape illustrations are excluded, but sketch-maps and sections are given in the text. The references to original memoirs are likely to be especially useful. The present part of 38 pages, so convenient to carry in the hand-bag, will form a companion for all scientific visitors to Denmark. One of the maps shows how the post-Glacial uplift of Scandinavia has affected a large part of the Danish peninsula and the islands. Bornholm falls into the Scandinavian region, and contains rocks from the pre-Cambrian up to the Liassic systems, unknown otherwise in Denmark. Attention is directed to the Middle and Upper Jurassic and Lower Cretaceous strata of Jutland, represented only by boulders in the drift. The various oscillatory movements that have given the kingdom its present outlines are well stated on p. 26.

A PRELIMINARY report on the mineral production of Canada during the year 1909 has been prepared by Mr. John McLeish, chief of the Division of Mineral Resources and Statistics, and published by the Mines branch of the Canada Department of Mines. The total value of the mineral production during the year was upwards of 18,000,000*l.*, an increase of 5 per cent. over 1908. Of this total, 49·9 per cent. represents metals, 49·7 per cent. non-metallic products, the remaining 0·4 per cent. being mineral products not reported. Coal is still the most important Canadian mineral, and constitutes 27 per cent. of the total. Silver occupies second place with 15·9 per cent., gold and nickel come next with 10·8 and 10·5 per cent. respectively, and copper contributes 7·8 per cent. The metals nearly all showed an increased output compared with 1908, while in the non-metallic class there is a larger number of products showing increases than those showing decreases. The increases were very noticeable in the cases of corundum, gypsum, natural gas, salt, and in the structural materials, cement, clay products, lime, and stone.

IN a paper published in Petermann's *Mitteilungen* Dr. Marquardsen, of Göttingen, reviews the present state of our knowledge of the topography and hydrography of the inland drainage area of the Sudan and Sahara. The total area of this region is estimated at 2,139,000 square kilometres. Dr. Marquardsen states some interesting results with regard to Lake Chad; the variations in size and level do not, in his opinion, indicate a progressive change in climate since its discovery by Denham in 1823; the lake appears to be shifting northward and gradually filling up. The question of the ultimate filling up of the whole basin, and breaking through of the streams which now supply Lake Chad, is discussed; and in this connection special significance is attached to the Logone-Tuburi bifurcation and the activity of the source streams of the Benue.

THE climatology of 1909, as recorded at the Juvisy Observatory, is reviewed by MM. Flammarion and J. Loisel in No. 2 (1910) of the *Bulletin de la Société astronomique de France*. The form of the discussion and of the comprehensive set of curves follows that of previous years, each element in the climatological record being discussed separately and compared with the same element in former seasons and years. Thus we see that 1909 was one of the coldest years since 1885, the mean temperature for the year (9·5° C.) being the lowest since 1891; in the matter of mean summer (June, July, August) temperature the value (16° C.) was the lowest since 1886, when the records were commenced. Similarly interesting comparisons are made for the other elements.

MESSRS. GEO. PHILIP AND SON have sent us a cardboard model, designed by Mr. Rupert Hicks, to show the relative positions of Halley's comet, the sun, and the earth during the present apparition. The model consists of a piece of stout cardboard 12 inches by 10 inches, near the centre of which is fixed a gilded disc representing the sun. Attached by an arm to the latter is a circle representing the earth, the revolution being provided for by the sun being pivoted at the centre. Then on a longer arm is affixed a model comet, which may describe an arc representing that part of the comet's path lying within the orbit of the earth. Thus one gets the comet's path, relative to earth and sun, from March 10 to May 30, and, by swinging the discs into their appropriate positions on the dated arcs, it is possible to see at a glance the conditions governing the visibility of the comet and its tail on any specified date; the tail is made long enough to illustrate the probable passage of the earth through it on May 19. The price of the model is 1*s.* net, post free 1*s.* 1*d.*, and as a method of illustrating to non-astronomical people the various conditions under which the comet appears and disappears the model should prove instructive and interesting.

THE February number of the Journal of the Institution of Electrical Engineers contains a communication made to the Manchester section of the institution by Mr. J. W. Warr on the electric ignition of internal-combustion engines. Descriptions of the principal methods of electric ignition at present in use are given, but the author expresses a decided preference for the high-tension method both for stationary engines and for motor-cars. The simplicity of the means of production of the current for low-tension methods is more than compensated by the trouble introduced by the mechanical contact breakers which are then necessary to produce the spark. Of the various high-tension methods, Mr. Warr considers that depending directly on a magneto machine to be the most trustworthy.

ACCORDING to an article in the February number of *Le Radium*, M. T. Bialobjeski has commenced at the Collège de France an examination of the effects of the β and γ rays of radium on the conductivity of solid dielectrics. His method is to use the dielectric in a condenser the plates of which are horizontal, the lower one being connected through an electrometer to earth, while the upper one consists of a thin sheet of aluminium foil kept in contact with the dielectric by means of a ring of lead. The rays from 1 milligram of radium bromide contained in a platinum capsule closed by a mica window fall on the upper plate of the condenser and pass through it to the dielectric beneath. The potential difference between the plates is maintained by storage cells, and can be increased to 1800 volts. The current produced is measured by the rate of motion of the electrometer needle. Sulphur, paraffin, wax, and amber have up to the present been examined. For discs more than 1 millimetre thick the current was proportional to the electromotive force used.

For smaller thicknesses the behaviour varied greatly with the material, but the author hopes to explain the whole of the phenomena observed by means of the ionisation theory.

THE launch of H.M.S. *Colossus* was carried out successfully on Saturday, April 9. This vessel has been constructed by Scott's Shipbuilding and Engineering Company, of Greenock. That the work has been carried out expeditiously will be evident from the fact that the keel was laid less than nine months ago. The ship will have a displacement of 20,250 tons, and has a length of 510 feet, beam 86 feet, and a designed speed of 21 knots. Parsons turbines and Babcock boilers of 25,000 horse-power will be fitted, and good progress has been made with these also. The launching weight was 7500 tons, and the vessel was completely afloat 58½ seconds after the first movement, which occurred without the vessel hanging on the ways for any appreciable time.

AN interesting article on the development of the hydraulic reaction turbine in America, by H. Birchard Taylor, appears in the *Engineering Magazine* for March. American makers have advanced greatly since 1890, and have abandoned the methods of "trial and error" in vogue prior to that date, methods which caused the Niagara Falls Power Company to go abroad for the designs of their first machines. To-day, American designers are in a position to design and construct machinery to meet the most severe requirements, and have to their credit the largest turbines in the world, among which may be mentioned the four 13,000-horse-power Francis turbines, now operating in the plant of the Toronto Power Company at Niagara Falls. The author of the article has given special attention to erosion, and brings forward evidence which indicates that trouble owing to this cause may be eliminated by correct design. Thus a bronze wheel under a head of 266 feet was so eroded at the end of a few months that it was necessary to replace it. A new wheel, of slightly different design, but of precisely the same material, ran five years without showing any signs of wear. Electrolysis and chemical action are considered by Mr. Taylor, who believes that both can be eliminated by properly designing the wheel blades.

THE issues of *Engineering* for April 8 and 15 contain a detailed account of some experiments upon the flow of water over triangular notches, carried out by Mr. James Barr at the James Watt Engineering Laboratories at Glasgow University, under the supervision of Prof. Archibald Barr. The late Prof. James Thomson first investigated this form of notch in 1860 and 1861 with rather crude apparatus. It speaks well for his skill as an experimenter that the present series, with elaborate and finely constructed apparatus, show no divergence from Thomson's conclusions. Thomson's law, that the quantity flowing is, in almost all cases, proportional to the 5/2 power of the head, has been verified. Further investigation shows that the prevention of the inward flow of the water at the sides of the notch, whether caused by the narrowness of the channel of approach or by the roughness of the up-stream surface of the notch, produces an increase in the quantity flowing over the notch. Various notches were experimented upon, the value of the coefficient in Thomson's formula for a narrow surface, right-angled notch being found to vary from 0·3104 at a head of 2 inches to 0·2995 at a head of 10 inches. Thomson's average value of 0·305 for heads from 2 to 7 inches must have been very near the truth. The articles are well illustrated, and give full tables and curves of results.

MESSRS. CONSTABLE AND CO. are publishing immediately a little book of pocket size, being a "Guide to the Preservation of Health in West Africa," by Mr. Henry Strachan, principal medical officer in southern Nigeria. They announce also the forthcoming publication of a series of essays dealing with the consideration of the introduction of an international language into science. Such a language has been constructed by an international commission, and the English edition of the essays in which it is presented is by Prof. F. G. Donnan.

MESSRS. W. WESLEY AND SON, Essex Street, Strand, London, W.C., have just issued a classified catalogue of manuscripts, books, and pamphlets on astronomy, including the libraries of the late Miss A. M. Clerke, Dr. A. A. Common, Mr. E. Crossley, and Captain W. Noble. The catalogue includes the titles of about 3700 works, arranged in alphabetical order, according to authors' names, in groups relating to the various branches of theoretical and practical astronomy and astronomical physics. The classification renders it easy to find the works which Messrs. Wesley have available upon any particular subject of astronomical study or research, and all who are desirous of filling up gaps in their libraries should see this catalogue.

OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF COMETS.—In No. 4402 of the *Astronomische Nachrichten* Dr. Wolf directs attention to a peculiarity in the form of comet 1910*a*. Besides the main and subsidiary tails, Dr. Wolf's photographs show a conical faint mass of material extending from the base of the coma towards the sun, quite different from anything he has seen in previous comets, and having the appearance of a miniature zodiacal light. The point of the cone was in position-angle 215°, 180° from the direction of the axis of the tail, and was at a distance of $13'$ from the nucleus.

Comet 1909*e* (Daniel) was photographed at Heidelberg on February 28, and Dr. Wolf also publishes the latest-determined position of comet 1909*a*, determined from a photograph secured on August 19, 1909, when the comet was fainter than the sixteenth magnitude.

Observations published by Dr. Graff in the same journal show that during January comet 1909*e* was a large nebulous mass, $3'$ in diameter, with a nucleus of magnitude 12·5.

OBJECTIVE-PRISM DETERMINATIONS OF RADIAL VELOCITIES.—An ingenious method of determining, approximately, the approach or recession of faint stars is proposed by Prof. Pickering in Circular 154 of the Harvard College Observatory. Various methods have been proposed before, but have not proved remarkably successful. In one of these it was proposed to introduce a standard artificial absorption band in the spectrum of each star, but the didymium and hyponitric acid filter then employed produced bands which were far too wide and hazy for precise measurement.

This difficulty has now been largely removed by Prof. R. W. Wood, who has devised a filter giving an absorption band at λ 4272 which is distinctly more definite than the hydrogen lines in first-type stars. The filter is a weak solution of neodymium chloride, and further experiments are in progress to reduce the thickness of the absorption band by the addition of lanthanum and phosphoric acid. Trial exposures have shown that for ninth-magnitude first-type stars the probable error, at present, is about 10 km., and for eighth-magnitude second-type stars somewhat less; a number of reproductions of the photographs obtained accompany the circular.

Prof. Pickering also enumerates the available objective-prism equipment at Harvard, and states that they are ready to take such photographs as may be desired; further, he invites cooperation from astronomers experienced in radial-velocity work.